

REMARKS

Claims 1-75 are now pending in the application. Claims 60-65 are allowed, Claims 1-59, 66-69, and 71-74 are rejected, and Claims 70 and 75 are objected to. The Examiner is respectfully requested to reconsider and withdraw the rejection(s) in view of the amendments and remarks contained herein.

CLAIM OBJECTIONS

Claims 60-63 are objected to because of certain informalities as detailed in the Outstanding Office Action. Applicant has amended these claims to replace the “series” language with “set” language and respectfully requests that the claim objections be withdrawn.

REJECTIONS UNDER 35 U.S.C. § 103

Claims 1-15, 21-32, 50-59, 66-69, and 71-74 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over JP '084 in view of JP '170. This rejection is respectfully traversed.

Applicant's understanding of JP '084 is that grooves are provided on the outer face of the tip 2 and on the inner face of the cap 3 in order to provide a passageway, or a flow path, for the flow of secondary gas. Similarly, JP '170 discloses “grooves” that “function as the flow path for the working gas ...” and that “create the gap as the flow path for the working gas.” Additionally, the grooves “function as fins to increase the heat radiation effect of the electrode ... and the surface area in contact with the working

gas is also increased.” Therefore, the grooves provided by the prior art references function to **create the gas passageway** through which a working gas flows and to increase the surface area for increased cooling. Neither of these cited references disclose a separate gas passageway, only a gas passageway formed by the grooves. Further, neither of these references disclose or teach turbulating a boundary layer, or increasing the turbulence within a boundary layer, to enhance convective cooling.

The claimed invention provides surface texturing to a variety of components, e.g., tip, electrode, shield cap, **in addition to a gas passage** between these components. The surface texturing of the claimed invention does not form the gas passage as do the grooves of the cited references. The surface texturing of the claimed invention is provided in addition to a gas passage formed between surfaces of adjacent components in order to increase turbulence within the boundary layer of the existing gas passage. Accordingly, Applicant has amended each of the independent claims to make this distinction more clear and to further distinguish the claimed invention over the cited references.

Since neither of the cited references teach or disclose surface texturing in combination with a gas passage to perform the function of increasing turbulence in a boundary layer, the claimed invention cannot be obvious. Therefore, Applicant respectfully requests that the present claim rejections be withdrawn.

Claims 16-20 and 45-49 stand rejected under 35 U.S.C. §103(a) as being unpatentable over JP ‘084 in view of JP ‘170 as applied to claims set forth above, and further in view of Luo et al ‘040. This rejection is respectfully traversed.

Luo et al '040 discloses ribs on an interior portion of a tip that function to radially guide the flow of a plasma gas in a swirling flow pattern to the outlet of the tip. The ribs of Luo do not function to increase turbulence in a gas passage between the tip and the electrode. Quite the opposite, the ribs of Luo direct the flow of plasma gas in a pattern rather than disturbing the flow and increasing turbulence within a boundary layer. Accordingly, the ribs of Luo cannot be considered as surface texturing that further provides the function of increasing turbulence within a boundary layer. Therefore, for at least these reasons and those stated above in connection with Claims 1-15, 21-32, 50-59, 66-69, and 71-74, amended claims 16-20 and 45-49 cannot be obvious and Applicant respectfully requests that the present claim rejections be withdrawn.

Claims 33-44 stand rejected under 35 U.S.C. §103(a) as being unpatentable over JP '084 in view of JP 170' and in further view of Stuart et al. The claims that include limitations directed to an electrode connection (34-36) depend from the amended independent claim 33 and distinguish over the prior art for at least the reasons stated above. Independent Claim 33 and dependent claims 37-44 distinguish over these cited references for at least the reasons stated above. Therefore, Applicant respectfully requests that the present claim rejections be withdrawn.

Additionally, the Office Action Summary indicates that Claims 70 and 75 are objected to, however, the Outstanding Office Action does not discuss these claims. Therefore, Applicant respectfully requests further clarification as to the status of these claims.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (314) 726-7524.

Respectfully submitted,

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